Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Unified models of E-layer plasma turbulence from density gradients and Hall currents[1] EHAB HASSAN, University of Texas at Austin, SANDEEP LITT, University of Saskatchewan, WENDELL HORTON, University of Texas at Austin, ANDREI SMOLYAKOV, University of Saskatchewan, FRED SKIFF, University of Iowa — The Earth's ionosphere is rich with plasma irregularities of scale-lengths extend from few centimeters to hundreds of kilometers. The combination of small-scale turbulence with large coherent structures is at the forefront of basic plasma turbulence theory. A new unified model for the small-scale plasma turbulence called Type-I and Type-II in the E-region ionosphere is presented. Simulations and a proposed laboratory experiment for these plasma waves in a weakly ionized plasma are reported. The ions [Argon in the lab and NO+ in the ionosphere] are collisional and the electrons ExB drifts produce Hall currents. The dispersion relations are analyzed for both density gradient and electron current driven instabilities. A basic understanding of the turbulence is important for forecasting disruptions in GNSS communication signals from RF signal scattering produced by the E-layer plasma turbulence on the 10cm to 10m scales lengths.

[1]NSF:AGS-0964692

Wendell Horton
University of Texas at Austin

Date submitted: 15 Jul 2013 Electronic form version 1.4